

# Identification of a city's soundscape using soundwalks

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**Abstract:** Sounds exist in natural and man-made environments. In a city, its sonic environment is shaped by three broad categories of sources: geophonies such as wind, rain, thunderstorms, etc; biophonies such as the sounds made by birds, insects, pets, and animals; and anthrophonies such as people's voices, music from hi-fi systems, and noises from traffic, ventilation systems, construction and demolition works, and trade activities. In recent years, soundwalks have become one of the key methods to characterize city soundscapes. Soundwalks involve a person (or a group of people) who follows a typical path, track or trail that can be considered as representative in the studied area. During the walks, sound recordings are normally made with a binaural microphone system and a recorder. The walker(s) will also make comments on the path, sound characteristics and sources, as well as take photos and notes on the map. The perception of sonic environment is considered as the soundscape of the place. This paper aims to present the practice of soundwalks as a tool in defining soundscape.

**Key words:** soundscape; soundwalk; user guide

## 0 INTRODUCTION

Soundscape has been popularized by R.M. Schafer who sees a place not only described by the visual images, but also by its sonic identity which involves sounds from natural and man-made sources<sup>[1]</sup>. Soundscape varies from city to city because the historical, cultural, and economic background of cities is not entirely identical and each city's morphology and climate condition is unique. Besides, it is not about how noisy a city is, but about how the city is perceived and understood by a person, a group of people, or a community due to its acoustic environment in a specific context. Thus, soundscape and its soundmarks - an analogy to landmarks which are unique to the place shall be meticulously identified and characterized<sup>[2-3]</sup>. As a city evolves, so as its soundmarks and soundscape.

In the past few decades, soundscape has attracted numerous research attentions. Some researchers approach soundscape from the social and historical perspectives<sup>[2]</sup>, the geographical, ecological, and cognitive perspectives<sup>[4-5]</sup>, and the urban planning, engineering, and management perspectives<sup>[4,6-8]</sup>. The International Organization of Standardization(ISO) recognizes that there are different opinions about the definition and aim of soundscape and the way how soundscape can

be characterized<sup>[9]</sup>. The ISO Working Group54of ISO/TC43/SC1 has established and published two standard documents with an aim to harmonize the definition, the methods, and measurements of soundscape<sup>[9-10]</sup>. Soundscape is defined as an "acoustic environment as perceived or experienced and/or understood by a person or people, in context"<sup>[9]</sup>. The ISO suggests that soundscape shall be characterized by a triangulation approach as shown in Figure 1<sup>[10]</sup>.

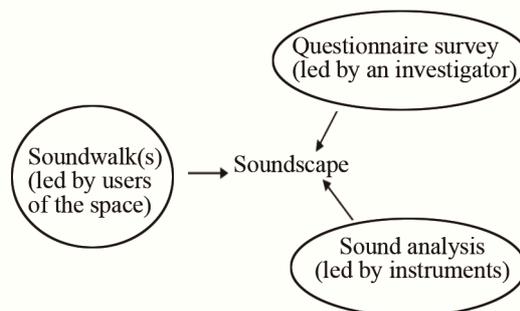


Fig.1 Evaluation of soundscape using a triangulation approach (adapted from ISO<sup>[10]</sup> and Engel, Fels, and Schneider, 2015<sup>[11]</sup>)

The triangulation approach involves a questionnaire survey, soundwalk(s), and sound analysis. The questionnaire survey aims at soliciting people's opinions on the level of loudness and the degree of pleasantness at specific locations using 5-point scale statements and open questions in which respondents can express their feelings freely. Sound analysis includes the extraction, identification, and characterization of

key features of the recorded sound. It may involve the calculation of loudness, and other psycho-acoustical parameters<sup>[11]</sup>. Yang and Kang reported that sounds can be classified according to their loudness, sharpness, and fluctuation strength<sup>[11]</sup>. A soundwalk is a method widely used in soundscape studies in which a person or a salient group of people walking along a planned route to explore the sonic features of the studied area<sup>[12,13]</sup>. Field recordings such as sound recording, taking photos, taking videos, taking notes, marking on map, temperature, wind, humidity, daylight measurements are normally made along the route of a soundwalk. These qualitative and quantitative information are useful to identify, characterize, and classify the sonic environment and the sources of sounds, so as to determine the soundmarks of the area as well as other climate factors that can affect the perceptions of sound due to psychological reactions<sup>[14,15]</sup>. After the walk, group leader will interview each walker to solicit her or his subjective experience. Sound recording and other visual data will be used in a laboratory environment to validate or further explore soundscape and soundmarks of the studied area<sup>[13]</sup>.

## 1 A GENERAL USER GUIDE OF THE SOUNDWALK

The purpose of a soundwalk is to identify soundmarks and soundscape of the studied area. Hence, the chosen path, track, or trail has to be representative and inclusive from the users' perspective. The users can be local people or tourists from different cultural and social backgrounds. Thus, a soundwalk should begin with a clear purpose to address a series of questions: who are the users, which path will they follow, when will they have the walk, where will they stop during the walk, what visual and sonic environments will they be exposed to, what are the typical weather conditions will they experience, what social and cultural events may attract them, and how long will they spend on the path.

To address these questions, the investigator who wants to commission a soundwalk study can make reference to the following steps:

(1) Identify the users – the perceptions of soundscape to a group of local people and to different tourist groups are not the same. Their understanding and experience of the studied area are different. Hence, it is up to the investigator to decide the beneficiaries of her

or his research findings.

(2) Identify the representative path(s) – people may choose to follow different paths in the studied area. Nevertheless, there are some common paths or walks many people would follow. For example, tourists who visit Macao tend to follow the same path to visit the historic center of Macao (see Figure 2) while locals tend to take a different path to buy foods and consumables in the same area (also see Figure 2). It is suggested that the investigator can use signals from mobile sensors, such as smartphones and other GPS devices, to track mobility of people and identify those popular and representative paths<sup>[16]</sup>.

(3) Develop a semi-structured questionnaire with close ended questions and open ended questions<sup>[14]</sup>. The questionnaire is used to solicit the walkers' views on the loudness and pleasantness of sounds, visual perceptions along the walks, and comfort levels due to weather conditions. The demographic information shall also be collected. The design of questionnaire can make reference to Engel et al. (2015)<sup>[14]</sup>.

(4) Train the walkers. The investigator shall brief the group of walkers about the purpose of a soundwalk and ask them to take notes, take photos, and respond to the questionnaire during the soundwalk when appropriate.

(5) Have soundwalks conducted at varying times on different days of the week. The investigator should lead the group of walkers in salient moving along the chosen path slowly. She or he shall take weather measurements, take sound recordings, take photos and videos, and take notes on the map.

(6) Have a closing briefing at the end of each soundwalk. The investigator shall report to the walkers about the information she or he has collected. She or he will have a very brief interview with each walker to obtain further information on the soundwalk.

(7) Analyze and report the collected data. Statistical analysis shall be conducted to test the repeatability and reliability of the collected data from close ended questions and physical measurements. For the information obtained from open ended questions, content analysis<sup>[17,18]</sup> – a methodology developed by social scientists including the following steps - defining concepts, constructing categories, creating coding forms, training coders, collecting data, determining inter-coder reliability, analyzing data, and reporting results can be employed. The investigator shall report the study's key findings and their implications.

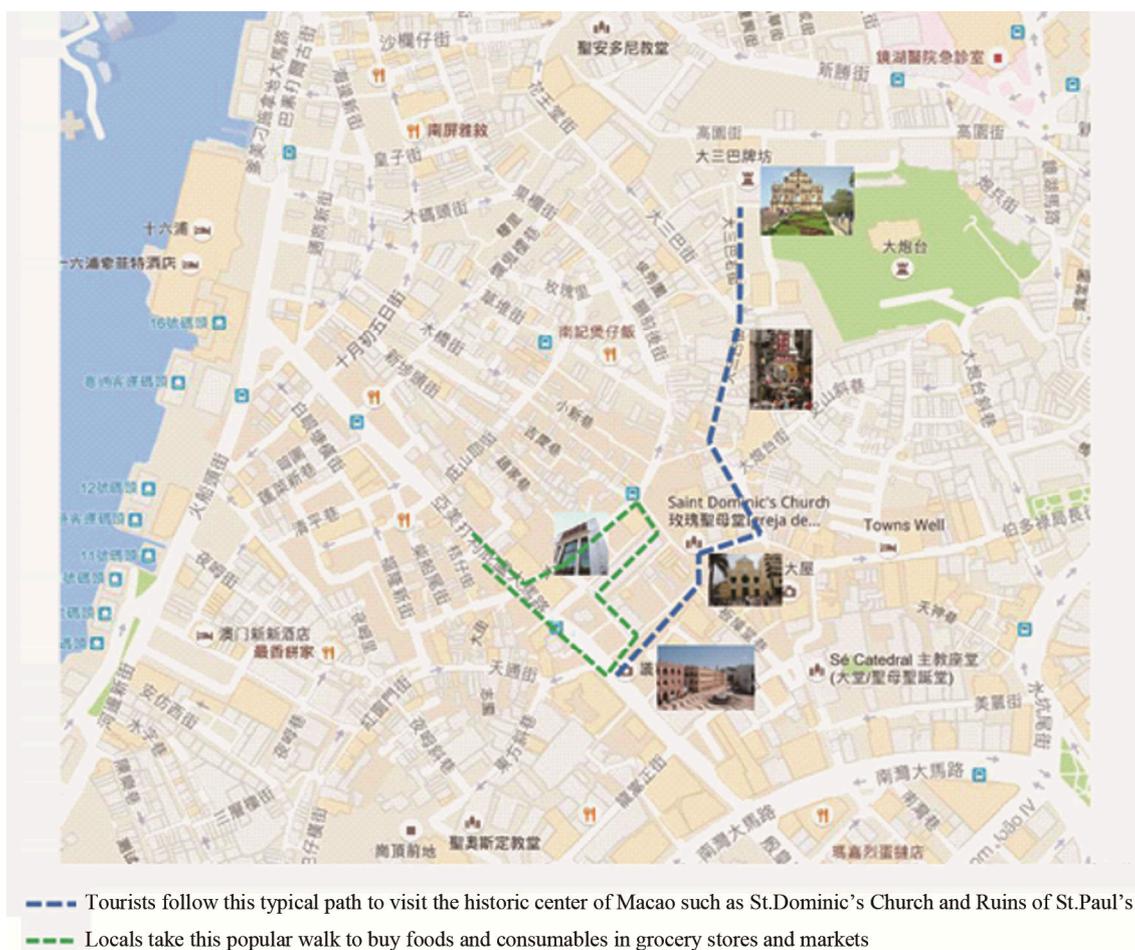


Fig.2 Two popular and representative paths near the historic center of Macao

## 2 CONCLUDING REMAKRS

As people now pay great attention to the quality of life, they will not tolerate a city's sonic environment to be only acceptable<sup>[19]</sup>. People ask for a better understanding of the city's soundmarks and soundscape and demand that soundscape shall be determined rigorously and scientifically. This paper briefly describes the history and nature of soundscape and presents a general user guide of the soundwalk – as a tool in defining soundscape. It is expected that the publication of this article will lead to further research on the development of soundwalks and the analysis of those information generated from soundwalks.

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## 城市音景的鉴定工具-声音漫步

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**摘要:** 声音存在于城市内的自然和人为环境中, 声音来源可分为三个大类型: 大自然声诸如风、雨、雷暴等; 生命之声诸如鸟类、昆虫、宠物和动物发出的声音; 人为之声如人声、音乐声、交通噪声、通风系统之噪声、建筑和拆卸工程之噪声、贸易活动产生的噪声。在最近几年, 声音漫步已成为表征城市声景的方法之一。声音漫步通常通过一群人在被研究区内有代表性的典型路径的漫步。漫步者把声音记录下来, 也将在路径上听到的声音特点和来源记录, 以及拍摄照片和在地图上标示。文章旨在为声音漫步提出一个实用指南, 方便它成为城市音景的鉴定工具。

**关键词:** 城市音景; 声音漫步; 鉴定工具

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